WORK IN PROGRESS

Theodor Holm Nelson

GENERAL SCHEMATICS:
INTRODUCTION TO THE TERMINOLOGY

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Rough and preliminary writeup for my colleagues at the 1990 Hacker Conference;

corrected with six small changes, all marked with "§"s: four trivial changes (§), one non-trivial addition of the word "not" (§§), and one slight addition (§§§).

Including this change.   §

©

INTRO

GENERAL

"General Schematics" is my name for a philosophico-linguistic enterprise on
which I have worked for some decades. Originally I thought it would offer
answers to great philosophical problems; now I see it as really a layered,
open-ended terminology for the discussion of complex subjects, including
philosophy. All the terms interpenetrate and may be used together.
This is meant to be a general language for saying what you see or think, or what
you think you see, an organized terminology for representing the world's
interweaving structures, and for expressing points of view about them.

It is my hope that by using this terminology you may be able to express complex
thoughts that would have defied ordinary language, thus carrying the pursuit of
ideas further. I hope it will give leverage in stating things nicely in new ways,
making it possible to say things we couldn't before.

The system supports both Platonic and Aristotelian models. Hegelian and
Husserlian models may likewise be expressed compactly (I think). While it has
tangencies and congruencies to aspects of AI work, it has evolved in parallel and
is informed by an extremely different outlook. I see these terms all as relevant,
not just one to the other, but all to our intellectual issues, everyday lives, routine
issues and crises, and to every political issue. Which is not to say they will
necessarily find everyday use, but perhaps in a few decades some of them might
become a part of everyday discourse. However, on some days I occasionally
think I am attempting a general philosophical synthesis in the form of a
comprehensive way of saying complex things.

(Note: the reason there is more material on "thematics" here is simply that those

are the notes that happened to be nearest to hand.)

Psychologists ask, "what is the mind that it can deal with ideas?" I ask, "what are ideas that they can be dealt with by minds?" This is structuralism gone mad, some might say; or perhaps simply structuralism turned into a tray of dental instruments.

THE LANGUAGE

This language is intended to be parenthetically nestable, e.g. "the thematics of the normatics" or "the flumatics of the strategic structures." (The suffix *ic* creates an, er, icky similarity among most of these terms.) I have tried to think of a lot of useful terminology that gives insight, and figure out how it might interpenetrate; the issue of finding a minimal set has not been part of the endeavor.   §§

So it's a grab-bag. I don't want to make rules in general about the system's use. But I have a meta-request: SOME TERMS ARE NOT DECIDED, so I hope the reader will give me the continued ownership of this terminology until I declare it a finished system. In some cases I will want to decide between competing terms (or find another), in some cases change a proposed meaning. Please stand by.

NOTATION. Boldface designates terms considered to be part of the system, for which special meanings are being selected. Undecdided terms are marked by using the linguist's convention for hypothetical words, an asterisk at the word's beginning, e.g. *roundedness, *entactics.

Why don't I include the term "idea"? Because it is so widely and variously used. But I think this terminology gives us tools for handling the whole range of ideas.

ORGANIZATION OF THIS DOCUMENT.

Individual terms are introduced, then some compound terms. This gives the impression that the terms are less interwoven than they are. Indeed, much of the difficulty of expounding this is in the total interweave of all the parts,

INTENDED PRODUCT(S)

This work saw a sort of completed form in 1958 in a paper called "Schematics, Systematics, Normatics," handed in to Michael Scriven for a Swarthmore philosophy seminar. Since that time I have been refining and redefining that work in tens of thousands of notes. Prospective book titles that have come and gone

include *Truth, Man and Choice*; a pair of volumes to have been entitled *The Ranges and Changes of Ideas* with companion volume *The Caring and Daring of the Human Soul*; and *The Whole Thing*. Favorite prospective title now *Prinicipia Schematica*. However, bookification or other resolution of this work (hypertextual, natch) will not be undertaken until decent tools are available.

I last tried to finish a book from these materials about thirty years ago, at which time I resolved that I would not again attempt a serious resolution of these materials into a book until I had a decent text organizing system on a computer screen-- meaning a system which permits side-by-side intercomparison of alternative organizations of the same material, presented transclusively. None yet exists, though I have designed a number of them (notably early Xanadu™) in the last thirty years. This situation infuriates me. I consider such a system one of the most fundamental tools of human thought, and when I look at the text systems software designers waste their time on, and make their customers waste their time on, it makes me ill. It is still my plan to wait on this work till there is a decent text system.

ACKNOWLEDGMENTS
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Theodor Holm Nelson
Autodesk Distinguished Fellow
Autodesk, Inc.
2320 Marinship Way
Sausalito, CA 94965
Tel 415/ 332-2344 x4679
Fax 415/ 289-4701
No network address, no home phone.

SCHEMATICS

By schematics I mean the Study of STRUCTURE, especially discrete and relational structure and models of it; of *Mapping, Models and Description.* And especially discrete structures which are *transposable.*

By discrete models I mean having a tinkertoy-like structure that can be modelled by a relational net, especially maps, diagrams, graphs. Of course, eventually that means everything, a semantic net; but the semantic-net people have something else in mind that I find mysterious.

Discrete: things can be pictured by sharp models. Where the breakdown into components is obvious.

Schematics is the representation of anything by discrete structures, i.e., discretely decomposable.

Korzybski: "The map is not the terrain." No, but the relationship between map and terrain, and the many possible moves that can be made to improve the fit, are of great interest.

A schematic is a discrete map, model, relational structure. *SCHEMATIC FIGURES are transposable structures of general interest. For example, "vicious circle," "triad," "history repeating itself."

STRUCTICS

The creation of structures I call structics. If it is done intentionally and explicitly it is *design*; I consider "design" the general term which subsumes all other creative structuring activity, such as writing and computer programming of the creative sort.

Structangle.

A structangle is a body of fact or premises, considered without regard to any decomposition.

Structangle versus "system," "syntax." "System" is usually defined as an ordered system of parts); "syntax" the connective rules by which parts are assembled into larger structure. A structangle *a way of considering* any set of elements and relations.

BACKGROUND FIELDS

are what specify the parts not specified explicitly in the foreground. In computing languages, for instances, it is the default conditions and general background stuff that makes such nuisance differences among programming languages. The object-oriented languages are a way, among other things, of

controlling the background fields. In worlds of description, controlling them is even harder.

DECOMPOSITIONS OR *DECOMPS.

A structural model may usually be decomposable in various ways; e.g., the facts of Euclidean geometry have been decomposed into five axioms from which the rest may be derived. Other decompositions are possible for the same content, the same structangle. But the structangle is a body of fact, assertion or ideas, taken all together without regard to their decomposition, such as the structangle of Euclidean fact. So the term "structangle" makes it easy to say: "Are we considering the Euclidean body of assertion in terms of the usual division into axioms, or as a structangle?"

A decomp refers to the division into parts, which may be arbitrary.

A *SUBDECOMP is a part of a decomp, from which portions of the decomp are omitted. Most things we think about are subdecomps. Another name for a subdecomp is an *ASPECT.

*EPISTICS

concerns epistemology, scientific method, social-science methodology, and the constraint-structures of description and modelling; especially whatever we can formalize about the structures of assertion dealt with in these pursuits, its argumentation and modification.

ABSTRACTICS

Abstractics concerns the process of abstraction and the selection of models and properties on consideration of instances. (Note that the number of instances can be one or even zero, as in theology.)

Typical stages of the abstractic process: selection of instances; alignment of selected features in common; selection of commonalities; locution of commonalities into a candidate formulation of what the commonalities are. There is always implicit generalization and prediction in the abstractic process.

WHOLICS (or *HOLICS or *HOLONTICS)

Wholics, holontics, etc. is the study of Global Properties (or what may be asserted by someone to be global properties).

PARADIGM AND WORLD-VIEW are background thematic wholic structangles. Wholics means looking for and at areas where there are predicates and soft principles applying to whole structures, or asserted to apply to whole structures. So to assert that something is a wholic principle says something about a certain area that we have to consider about certain things we have to take into account; that there is a wholic principle is to assert that X is a principle or property of significance applying to something as a whole. Or that there is something applying to something as a whole that has to be taken into account.

To assert that there is a wholic principle is a way of saying you're taking too small a context.

For example, design. To say that art and design are wholic means that you have to take the design problem as a whole, you can't separate the parts and do them one by one. The mind has to take in the whole picture.

CONSTRAINTS

are relations held to be true. A descriptive structure is commonly a structangle of definitions, assertions and ASSERTIVE CONSTRAINTS in an inseparable mix. Just as definitions are rarely separable from the assertions, so the condition of assertive constraint is a hard-to-locate condition of certain substructures movable form of emphasis.

GENERATORS

GENERATORS are structures which in combination create entire structangles (whether by logical derivation or enactment).

RECOGNIZERS

LOCUTIONS

A locution is a statement of something in specific symbols or words; which involves a schematic, a decomposition, and possibly connotations and emphasis.

DOCTRINAL AND COGNITIVE OPERATIONS.

These operations are what we do to modify schematic structures to match reality or satisfy other constraints (such as ego needs).

Often a schematic structure may be overconstrained. In the realm of description and modelling, overconstraint can be dealt with in a *constraint relaxation process.

SYSTEMATICS

Systematics: the generalized models of how things work. A systematic, for example, of swimming would be a weighted property-space model of all the different strokes and their concomitants and results.

FLUMATICS

Flumatics: the study of resemblance, transition, gradation and flow (from the word for river, of course).
Smoke, eddies in the water, constant transition, so that a thing is almost the way it just was.

A FLUMATIC MANIFOLD is a substructure in property-space connecting all the things which are *like* each other; the kicker being that there are many kinds of likeness, and so the manifold sprawls in all directions forever, unless we specify its crieteria.

WHOLICS OF FLUMATICS. One wholic principle of flumatics is that a flumatic manifold can open in anydirection.

THEMATICS or *THREADED LOGIC or IDEA DYNAMICS.

GENERAL

Thematics is an endeavor to study the organization and dynamics of ideas, and is a set of terms for noting these. In particular, thematics is the structure and design of ideas, the relation of principles to instances, and the web of hard or soft definition.

It is intended to be more general than conventional logic and set theory, which are subsumed as a special case, as are themes in music and art.

Attempting to establish, create or induce some kind of principle is the same thing whether it's in art or science; thematics is an attempt to attain a unified understanding of what underlies all varieties of this activity.

*PRINCIPLES, *THEMES or *PRINS

The most general term is the **theme, principle** or **prin.** A theme can be **hard** or **soft**; a **HARD THEME** or **HARD PRINCIPLE** is a theme which can be precisely defined. A **SOFT PRINCIPLE** cannot be precisely defined.

THEMES AND *INSTANCES or *ITEMS.

A theme can be designed and represented as thread connecting instances: a line (preferably wiggly), and the instances are points on this line. The set of instances is the ***REACH, *SCOPE, or *EXTENT** of the theme. *The designer of the theme decides what points are on or off.*

instance not included
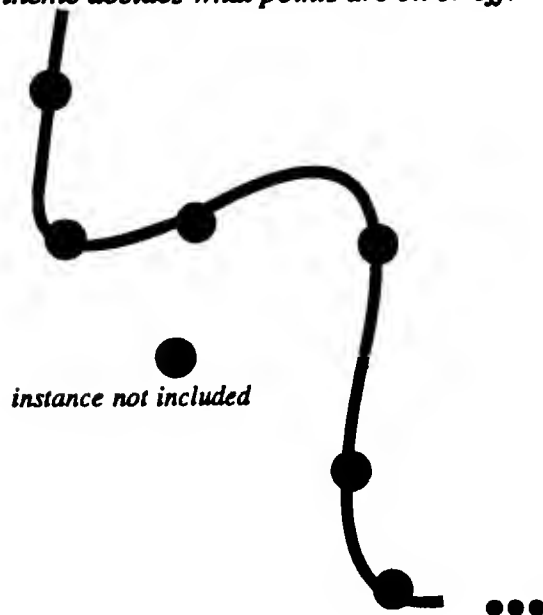
ACCORDANCE.

The relation among instances and themes I call ***ACCORDANCE.** There are three values of accordance: ***BEFIT** or ***ACCORD, *CLASH** or **DISCORD,** and no relation.

HARD AND SOFT THEMES OR PRINCIPLES

A hard principle has an exact method of determining which are its instances: enumeration or other precise definition, and is therefore subject to deduction

and set theory. Hard principles allow a class-inclusive specification, such as an exhaustive enumeration, induction, or precise recognizers for instances. For a **SOFT PRINCIPLE** there is no exact way to recognize the members, but often "you'll know them when you see them;" the paintings of Van Gogh, for example, or the comics of Robert Crumb. Is there a way specifically to recognize another case of an instance? In that case we have a hard principle, subject to formal logic. If somebody gets to decide on some other basis what things are instances of this principle, it is a soft principle. A soft principle's possible instances are not enumerable and are non-predictive.

DIRECTIONAL PRINCIPLES

A directional theme, such as a plot thread which occurs in time, has a "more than" relationship.

A plot is a series of directional themes whose intersections are of special interest. You have various events and characterizations you want to include in the plot. These are the instances you want to weave in. Plot themes are *directional*, however, moving in story-time and interweaving. Two characters are themes, and their meetings and mutual events are co-entwinings of the themes.

Shakespeare's "Ages of Man" is also a directional theme. Directional themes take many forms.

*SPECIFICATIONS, *SPECIFIERS, SPECIFICATIONAL STRUCTURES.
A specifier is a relation between two or more principles and/or instances that tie down their meaning.
SOFT AND HARD SPECIFICATION
Specification may also be hard or soft.

A definition, in the usual sense, is a hard specifier. Hard specifiers are also called **PREDICATES**.

Soft principle, clearly, is where you do not have a clear or exact specifier.
INSTANTIAL SPECIFICATION
is specifying by enumeration one or more instances that are part of a theme.

SPECIFICATION BY A THEME

is specifying the scope of a theme, or part of the scope of a theme, by another theme.

As ideas develop,

specifiers which are considered definitional may cease to be definitional and other portions of the network will be considered definitional.

CROSS-PREDICATION AND CROSS-SPECIFICATION

Cross-predication is saying that A is definitely a B.

Cross-specification is the general case. Soft specification would say that A is a B, but maybe we can't tell you why.

SOFT ON THE OUTSIDE: SECONDARY SOFT SPECIFICATION

where you have an unclear second-order specifier-- asoft definition may in turn define the first hard definition.

ALL IS SPECIFICATION.

All the relations in a net may be considered as specifications, subject to possible loosening or revision. Which are privileged? This topic, then, is
*SPECIFICATIONAL WEAVE.

SPECIFICATIONAL WEAVE refers to the definition of the definitions of the definitions and can get quite hairy. At some places the definitions are very clear and after that they feather off.

In conventional logical analysis, it is assumed that we know which qualities are defining and which are contingent, synthetic, empirical. This is naive. Concepts exist in a grid of mutual specification rather like a cargo net; the concrete instances of the world are the cargo. The weight can shift.

RAMIFICATIONS

Ramifications are instances which in some sense *follow from* themes, however they may be defined. Hard ramifications are *deductive consequences*. Soft ramifications, since they have no definition, can only be clarified by example. "That's exactly what that character would do!" is a soft ramification, since it

does not follow deductively or by certain knowledge, but *makes sense* afterward. The parallel to deduction has numerous aspects there is no room for here.

SOFT LOGIC

Notice also that soft thematics-- "making sense," appropriateness-- corresponds to the way most people outside academia *use* the word "logic."

"It's only logical that he would do that."

"It's not logical for them to put up a fight."

THE ENTANGLEMENT OF RAMIFICATIONS

The entanglement and resolution of soft ramifications is what makes a good story, plot developments, character development, symphonic beauty, good design. The entanglement of hard ramifications is what makes program bugs and bad software.

Thematic resolution of ramifications, seeming right, also occurs in dance and the other arts.

Thematic resolutions appear retroactively obvious: they seem right, as in plots.

CHANGING THE HARDNESS OF A THEME

Science is often the task of turning soft principles into hard ones. Art is often the converse, though the hard-edged art minimalist may also seek to create hardened principles, even with predictive value.

*MIXED LOGIC, *MIXOFT LOGIC, *FLUFFY LOGIC, *FIRM LOGIC

is where there is a mix of hard and soft themes and/or specifiers.

DIFFERENT WAYS OF DESIGNING A THEME

We are always trying to design and select the scope of themes-- definingprinciples and their relations to instances. This is a game with a variety of possible moves. You can specify a set of instances by enumeration; take instances out of the set or put more in. (Then you can try to "figure out" what the principle is-- that is, find out its additional traits or specifications. This can be hard-edged science or it can be the loosest artiest attempt to characterize.) You can make a hard definition so it becomes subject to set theory and logic (a hard principle).

Having found a specified principle that doesn't quite fit your designated scope, try to shave and modify the principle to fit that certain set of instances.

Or you can you define the principle and see what instances follow from it.

Or you can just stick with soft principles.

Or, in your structangle of thought, have a mix of hard and soft principles and specifiers, which is the most interesting-- where you haven't decided which specifiers are hard and which are soft.

THEMATICS OF FACT AND SCIENCE
DESIGNING THEMATICS OF FACT: The criterion for designing thematics of fact has to do with selection of specifiers, checked for evidence or probability. This happens all the time in science. And in science the criterion of whether your specifications are correct or reasonable has to do with the coextensivity of the sets that they determine.

SPARSE AND ELEGANT STRUCTURES
thematics of fact selected for elegance (such as cosmological theories) are special cases.

Sparse and elegant schematics not of fact: GOOD DESIGNS.   *§§§*

PARADOXES HARD AND SOFT
Paradoxes come at various levels. A hard contradiction must be resolved since it deals with predicational structures that we insist on being consistent, either by modifications in the structures or in the consistency field (as with reconciling the wave-particle duality). Soft paradoxes and soft contradiction present no problem. The issue of resolving them is *PSYCHOTHEMATIC. Instance alpha accords with prin A and prin B, though prins A & B softly contradict. She's moody but she's constant. No problem. Oxymorons often seem niftily sensible: "Plus ca change, plus c'est la meme chose."

MISCELLANEOUS INSIGHTS (no time to fold into the rest of this section)

Soft principles don't need to be proved valid. They just seem right.

Elegance is a thematic property, having to do with parsimony and locution.

Making sense is a thematic property.

I finally figured out what cosmology was about: the different cosmological theories are exploring a sparse thematic space looking for elegant formulations. The ones that make sense are far apart. For a formulation in theoretic physics to make sense it must be parsimoniously and elegantly expressible and cover and subsume a very great deal.

Soft accordance just seems right. A nice example is the high-school dance with the theme "Enchantment Under the Sea" in the film *Back to the Future*. Anything natatory, nautical, aqaueous, molluscal or piscatory fits in. You can come as a lobster, a wrecked galleon or Esther Williams. Same with a Busby Berkeley dance number. Or what can be an appropriate reply in cocktail-party conversation.

The grade-school question that drove me nuts: "What is the next number in this series: 2,4, 6, 8 ..." I would say to the teacher *we can't know*, and would be "corrected." See how nicely thematic terminology lets us express this problem: we have a set of instances with no basis for inducing a hard principle; we can guess at it, with different candidate specifiers resulting in different sets of additional instances.

*ROUNDEDNESS or *SWEEP

is the property of completeness or rightness of a theme, like the roundedness of a wheel.

Note that while I am a great fan of Richard Dawkins, I take exception to his model of "memes." I believe that ideas have particular dynamics of organization, passed over by the memic model.

"Opposites" are instances separated by a relation of discord or clashing according to some theme which may be induced between them.

NORMATICS

Normatics is the study and use of discrete models, especially generalizing discrete models predicating or specifying about behavior (rather than endeavoring to describe it). Normatics is about discrete models involving potential action, especially rules and rule-structures, plans, administration-- predicational structures of intended applicability to what will or should happen in the world, normative models, ethics. (Note: I think I coined this word in the mid-fifties, then later found it in a very old Funk & Wagnalls dictionary with essentially this meaning!)

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*CRITERIALISM or *CRITERICS

is concerned with standards and their pragmatics: situations where you are going to check on the results, whether they work, and especially the character of their side effects. All systems of criteria act as lathes and chisels to form behavior and other traits. For example, tests of student achievement; check lists (will this checklist really fully prepare the airplane?) Body count as a measure of whether we're winning a war. What is the list of things we really want done?

*REACTICS or *REACTIVE STRUCTURES

Reactics is the study of objects which interact. We could say it was the generalization of automata theory, but I expect this to go potentially in many other directions-- especially where it comes to the simulation or modelling of complexes and ecologies of jumpy little objects and epiphenomena they may generate.

*GENERAL STRATEGICS or *SOCIAL STRATEGICS *ENTACTICS

The structural analysis of situations, as in chess, is a deeply fascinating matter, and has received far too little formal work. The finest work is that of Thomas C.

Schelling (*The Strategy of Conflict*, 1960), in which he generalized and liberated game theory by showing that adding communication and non-zero-sum payoffs totally changed the framework in which game theoriests and strategists had been operating.

I suggest the word **ENTACTICS** as a distinctive and non-confusing word suggesting *the tactics of entities*-- that is, since we are separated beings, with imperfect communication and distinct interests, we naturally communicate strategically.

So that general strategics or entactics would look foundationally at the definition of creatures as separated social entities; i.e., this is a theory which applies to people, animals, corporations, robots. So we can find principles of entactic strategy applying to individuals, nations, firms, animals, strategic robots, even non-calculating animals who have these strategies wired in (e.g. threat behavior of shrimp). My contention is that Freud had it backward: nations don't behave like babies, babies behave like nations.

I have always thought this area of situation analysis presented a foundational basis for a whole new level of analysis of social behavior, one which is all too little understood for its own sake-- the study of maneuvering, self-presentation, bargaining (including especially commitment and threat), and the degree to which these represent an aspect of the behavior of people, animals, nations, companies, and eventually robots.

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*SOCIAL PRESENCE is the acknowledged presence of another person; greetings and goodbyes bound this state, and to ignore another person is often a social act.

*SOCIAL FIGURES,
    or transposable discrete social-strategic configurations, are of many types: general social (greeting, apology, offer ...), human-social (lovemaking, meals ...), general cooperative and adversarial, military, market. There will be other areas, and of course the combinations of all of these.

    Strategically, there are levels of play-- levels of awareness, levels of ability to control impressions, levels of consideration of the situations; and the ability to

pretend, as well as to out-psych the other (which even foxes do well). We consider the other player's conceptual structure, the other player's considerations.

*STRATEGIC FIGURES or ***MANEUVERS** are transposable strategic situations, or ***BEHAVIOR-ANALYTIC** or ***ENTACTIC-ANALYTIC** structures. For instance: acknowledgment, threat, bid, gesture, greeting, dismissal, attack, bluff.

What communications can be achieved through specific strategic-presentational windows? (***ENTACTIC WINDOWS** becomes a much simpler term, you see). Example: if you can't mention money it's hard to ask for a loan, but you might be able to hint. Can a stranger make a credible threat with a popsicle stick? If you can't mention sex and don't have any body language, it's hard to hint about a date but you can do it. The presentational windows have different degrees of openness.

The allowed moves in the game of Diplomacy tend to generate World War I.§ That is the kind of generative structure I think we can do for much of life. And one of the things I want to do is develop Lisp programs to simulate social strategics.

(In an unprinted manuscript, I contend that I found a minimal set for essentially generating most traffic patterns. And it's strategic. The *block*, the *pin*, the *race*, the *car-length calculus*.)

I think it's possible to develop a foundational sublayer of social science-- a strategic sublayer of social science where strategic models are buildable in Lisp. Such as the traffic principles.

MIXED SCHEMATIC MODELS

STRATEGICS OF NORMATICS.
What are the best strategies for establishing rules or other normatic structures?

NORMATICS OF STRATEGICS.

This covers ordinary ethical issues, as well as operations-research issues of what sorts of strategies work well.

THEMATICS OF STRUCTICS.

A CONSTRUAL is the specification of a decomp or subdecomp, considered simply as that set of relations which specify it. A LOCUTION is the expression of a construal in words or symbols.

Accordance in a structangle need not be complete. A SUPERCOMPLETE STRUCTANGLE is one which has discordant features. In hard principle these are called contradictions. In a dream, however, or a mythical canon such as the stories of Herakles or Bugs Bunny, there is no such problem. A novelist or other designer works with supercomplete structangles, usually until they resolve into an ordinary structangle, but in some cases it may remain supercomplete.

THEMATICS OF FLUMATICS.

Thomas Wolfe, Proust, Heraclitus talked about the river of time, everything changing. Trying to seize it, trying to see what stays the same and what's different.

Predicational thematics of flumatics: you can build predicates of a flumatic domain such that the predicate applies to a perceived structure at times $t1, t2, t3$.

Dance is **flumo-thematic**. Endeavoring to find styles of movement which can these days be quite idiosyncratic, which create a unified stylistic impression through a series of movements coordinated with the music. Perhaps it has other properties like grace or the expression of other emotive qualities.

Flumatics of thematics: the manifold of related models of the same domain. But of course the domain itself is not flumatically distinct, feathering out in all directions. Specification establishing a domain may be one operation in a complex process of specification work.

THEMATICS OF ABSTRACTICS.

Finding cross-cutting consistency among instances, so that predicates criss-cross most cleanly-- generalizing, in other words, Hume's *constant conjunction* as the criterion of repeatability and exact generalizability over instances.

ABSTRACTICS OF FLUMATICS

An abstraction may be considered a subdecomp of the flumatic manifold.

THEMATIC FLUMATICS OF ABSTRACTICS.

Let us consider again the search for scientific fact, i.e., repeatability and exact generalizability over instances and time. Science and the induction of exact generality may be imagined as operations on specification structures in flumatic space: the designation of those specifiers which define a flumatic manifold have the greatest cross-cutting consistency.

THEMATICS OF NORMATICS.

Thematics of fact versus law: The criterion for designing thematics of fact has to do with good cross-cutting thematic structure, the thematics of law or decree tend involve intended result.

The great law-givers and great negotiators are basically working with structures of premises, trying to find clean ways to divide things up, to create principles for a solution. You've heard that hard cases make bad law: they lead to the formulation of ragged principles, whose instances don't fit well under thematic definitions, which have jagged edges in the definition of the principle. The best system psychologically and administratively and is a *rounded or elegant system, a relatively few principles that are easily understood and acted on. E.g. Ten Commandments, Justinian Code, Napoleonic Code.

SUPERCOMPLETE NORMATIC SYSTEMS, such as the body of U.S. law, or the collection of advice you would get asking around the office about an ailment, can be resolved in various ways. How to resolve conflicting or overconstrained normatic structures: there are various styles. You may compare with great scripture (Supreme Court, Talmudic interpretation); compare with legal precedent; resolve each issue once and forever (old Soviet system); or, as in the latest California ruling, mandate that any contradiction between **operative structangles**-- in this case voter initiatives-- results in the total defeat of the one with the fewer votes.

THEMATICS OF STRATEGICS

Trying to figure out the ramifications of strategies, good or otherwise, and/or understand the other player.

WHOLICS OF SOCIAL STRATEGICS

Consider the von Clausewitz remark, that war is the continuation of diplomacy by

other means, is both wholic and strategic-stuctural.

OTHER NELSON WORK

In case you wonder where this fits in my career, it is the comprehensive philosophical outlook of my other work. Note that I intend to write no hypertext versions of anything, or attempt a more serious version of this, until Xanadu is fully functional.

I do dry-masonry of ideas, trimming and fitting minimal sets of ideas over long periods of time. Four such projects have gone over thirty years, two others over ten years. And what I do is what is called above "thematics"-- whittling and refining principles to cover instances.

Example 1 of minimalist hard-edged thematics. The principles of the Xanadu™ system--

> generalized linkage and transclusion-- cover a hell of a lot of instances minimalistically and in a hard-edged fashion. (A brief note from our sponsor on the upcoming Xanadu™ software from Autodesk, Inc. Xanadu is both system and ideology, a server intended to handle stable representations of the true interconnections of information (even between objects which are constantly changing), and an intended cosmic repository publishing system for all types of objects, with royalty on every fragment withdrawn by a user automatically paid to the publisher of that fragment, and with transclusive re-use (*transclusion* meaning instancing, or virtual inclusion, across document boundaries).)

Example 2 of minimalist hard-edged thematics. My upcoming new software paradigm,

> the hypergrid (still secret), especially as manifested in my design, under *ONE* carefuly-designed principle, of a general-purpose interface/language/data structure called ZigZag™. (Object-oriented programmers interested in working on this and who don't need cash up front please contact me: long hours, low pay, possible fame and fortune.)

Example 3 of minimalist hard-edged thematics. Biostrategic theory

> and the biostatus hypothesis, which represent a radical new hypothesis subsuming much of psychology. (This was handed out at the Hacker Conference in 1987 as

a short piece called "The Secret of Human Life.") It is projected as two books: *Biostrategy and Polymind: A New Theory of Human Life* and a second volume, *The Human Sexual System*.

Example 4 of minimalist hard-edged thematics. General schematics itself.

Example 5 of minimalist hard-edged thematics. **ACCESS STRUCTURE** (which I published obscurely about 1979)-- constitutes, I think, a Very Simple But Important Model.

The access structure of something is how many levels of operation are required to get at it, to put it into use. For example, this pen is in use. It's not writing at the moment, but it can point, it can start writing at any instant. When the gun is in your hand, even if not fired or even pointed, it's in use. You might be threatening with it, you may be pointing it, but it's in use. Definition: **ZERO-ORDER ACCESS** means "in use." First-order access means that one covering operation is required to put it into zero-order access. Second-order access means that one operation is required to get to first order access-- it's in the drawer, the cap is on, or whatever. So we can create a discrete model of the access structure.

For example, when the desk drawer is open, a lot of things have had their access-level changed. Opening or closing a computer directory likewise changes access level.

Now, we can make access-order maps of things. For example, what can I reach? I What is now at first order access? I put my hand in the drawer-- now a number of different things are simultaneously lowered by an access order. The pen in my pocket is at third-order access (remember that we have to put the cap on the other end, which is a step). For a man to urinate, typically four access steps are necessary, not counting obtaining the vessel.

Access structure provides a formal tool for new understanding of "convenience," of buildings, storage, work areas and cockpits, and especially of interactive computer software (Lotus menus are a particularly pernicious instance of access structure.) Recognizing that well-designed access structure should be a *primary* aspect of good design, and not just an accidental aspect, could put us on the road to decent design at last.

Example 6 of minimalist hard-edged thematics. **SPLANDREMICS, FANTICS**

AND VIRTUALITY.

My own theory of software design, the theory of virtuality (*not* to be confused with the current fad of "virtual reality" and the all-encompassing use in that church of the word "virtual"). I have been propounding this theory under this name for over a decade. But I used other terms first.

I was looking in the early sixties for a general term for the general principles of computer display. I chose **SPLANDREMICS** for approximately what I later called **FANTICS** and now **VIRTUALITY**. I have worked on the thematics of these ideas great length now.

But "splandremics" still has charm because it sort of combines splendor, and the words split and splay-- after all, you are splitting and splaying the electron beam to the screen. You are splitting and splaying the different things that you are presenting into different areas and different forms of representation; you are splitting and splaying the different responses of the user into the response alternatives. And "emics" is the generalized term from the 1940s school of structural linguistics.

Splandremics is also a schematic model, a discrete model of what you're showing the user, and how it matches the user's conceptual structure, and how it is manipulated discretely by the user. The user has a structural model in the mind; the system presents a structural model on the screen that matches as well as possible.

Splandremics is computer presentational and interactive art, and is thus quite distinct from general programming.

By "fantics" I mean the art of presentation (from Greek *phainein*, to show, as well as fantastic, phantom, etc. as more recent derivatives). No one was too interested in this, so I now call my (one-man) school of software design "virtuality design." By virtuality I mean the opposite of reality-- the *seeming* of something, which consists of conceptual structure and feel. Computer people have no particular competence in designing seemings, which is usually the business of film-makers.

Basically I consider interactive systems to be a branch of cinema. A film is a designed series of happenings on a screen contrived to affect the mind and heart of the viewer; interactive software *adds to this* the dimension of interactivity. Interactive software *adds* the dimension of interactivity; hence software design is

literally a branch of cinema. Filmic training is far more relevant than computer programming. Just as with film, a director is needed, for the good effects and seeming must be completely unified and cannot come decently from committee design.

As in cinema, the problem cannot be decomposed; all the effects must be woven and balanced by a single director. Failing to understand this is one of the principal reasons that almost all interactive software available today is abominable. (This "metaphor" nonsense has gone far enough.)

Designing the ideas of the software is itself thematic. My favorite example is Pac-Man, whose obviously designed principles are minimalist and self-revealing.

Access structure is an additional key aspect of software design, which should be far more explicit.

More later.

Ted

Theodor Holm Nelson

GENERAL SCHEMATICS:

INTRODUCTION TO THE INTERMEDIAGOLOGY